Nov 8

# Nov. 9: Paul Debevec

by uscanimation

**Paul Debevec** leads the Graphics Laboratory at the University of Southern California's Institute for Creative Technologies, is a Research Professor in the USC Computer Science Department, and is the Vice-President of ACM SIGGRAPH. He earned degrees in Math and Computer Engineering at the University of Michigan in 1992 and a Ph.D. in Computer Science from UC Berkeley in 1996. He began combining research in computer vision and computer graphics in 1991 by three-dimensionally modeling and rendering his ***Chevette*** automobile from photographs. At Interval Research Corporation he contributed to Michael Naimark's ***Immersion '94*** virtual exploration of Banff National forest and collaborated with Golan Levin on the interactive art installation ***Rouen Revisited***.

Debevec's Ph.D. thesis under Prof. Jitendra Malik presented ***Façade***, an image-based modeling system for creating virtual cinematography of architectural scenes using new techniques for photogrammetry and image-based rendering. Using Façade he directed a photorealistic fly-around of the Berkeley campus for his 1997 film ***The Campanile Movie*** whose techniques were later used to create the Academy Award-winning virtual backgrounds in the "bullet time" shots in the 1999 film ***The Matrix***.

Following his Ph.D. Debevec pioneered techniques for illuminating computer-generated objects with measurements of real-world illumination. His 1999 film ***Fiat Lux*** rendered towering monoliths and gleaming spheres into a photorealistic reconstruction of St. Peter's Basilica, realistically illuminated by the light that was actually there. Techniques from this research known as HDRI and Image-Based Lighting have become a standard part in visual effects production, used to dramatic effect in films such as the ***The Matrix*** sequels, ***The Curious Case of Benjamin Button***, ***Terminator: Salvation***, ***District 9***, and ***Avatar***. Debevec leads the design of HDR Shop, the first high dynamic range image editing program, and co-authored the 2005 book ***High Dynamic Range Imaging***. Debevec's 2004 film ***The Parthenon*** used 3D scanning, inverse global illumination, HDRI, and image-based lighting to virtually reunite the Parthenon and its sculptures, contributing to depictions of the Parthenon's history for the 2004 Olympics, NHK televison,PBS's NOVA, National Geographic, the IMAX film ***Greece: Secrets of the Past***, and The Louvre.

At USC ICT Debevec has led the development of several ***Light Stage*** systems that capture and simulate how people and objects appear under real-world illumination. The Light Stages have been used by studios such as Sony Pictures Imageworks, WETA Digital, and Digital Domain to create photoreal digital actors as part of the Academy Award-winning visual effects in ***Spider-Man 2*** and ***King Kong***, the Academy Award-nominated visual effects in ***Superman Returns***, ***Spider-Man 3***, ***Hancock***, the Academy-Award winning visual effects in ***The Curious Case of Benjamin Button***, and most recently James Cameron's ***Avatar***. The most recent light stage process based on polarized gradient illumination was used in 2008's Digital Emily project, a collaboration with Image Metrics which produced one of the first digital facial performances to cross the "Uncanny Valley". Other recent work led by Debevec includes ICT's 3D Display and 3D Teleconferencing systems.

In 2001 Debevec received ACM SIGGRAPH's first Significant New Researcher Award for "Creative and Innovative Work in the Field of Image-Based Modeling and Rendering", in 2002 was named one of the world's top 100 young innovators by MIT's Technology Review magazine, and in 2005 received a Gilbreth Lectureship from the National Academy of Engineering. In 2005 Debevec received the Special Award for a Distinguished Professional Career in Animation/VFX from the Mundo Digitales Festival in A Coruna, Spain and in 2009 received the "Visionary Award for VFX" at the 3rd Annual Awards for the Electronic and Animated Arts.

In February 2010, Debevec received a Scientific and Engineering Academy Award® for "the design and engineering of the Light Stage capture devices and the image-based facial rendering system developed for character relighting in motion pictures", shared with Tim Hawkins, John Monos, and Mark Sagar.

Debevec is a member of the Academy of Motion Picture Arts and Sciences, the Visual Effects Society, and ACM SIGGRAPH. He chaired the SIGGRAPH 2007 Computer Animation Festival and co-chaired Pacific Graphics 2006 and the 2002 Eurographics Workshop on Rendering.



**Related**

Oct. 26: 13th Annual Animation Show of Shows
10/26/2011
With 34 comments

Nov. 2: Evgeni Tomov
11/01/2011
With 35 comments

Sept. 28: Noureddin ZarrinKelk, Iranian Animator
09/27/2011
With 38 comments



Recent Posts

- Dec. 7: DreamWorks Animation
- Nov. 30: Mike Fink
- Nov 16: DADA Seniors
- Nov. 9: Paul Debevec
- Nov. 2: Evgeni Tomov

Archives

- December 2011
- November 2011
- October 2011
- September 2011
- August 2011

Blogroll

- Official DADA website

This entry was posted in Uncategorized.

← Nov. 2: Evgeni Tomov

Nov 16: DADA Seniors →

## 29 comments on "Nov. 9: Paul Debevec"

**Ryan Gillis** says: 11/09/2011 at 10:16 PM

Mr. Debevec's presentation was one of the most pleasant and conversational I think we've had so far. I felt like I was getting a lecture from a teacher who was really excited about their class. The technology he was presenting is especially fascinating because of how rapidly it develops. One of the main reasons I was so engaged by his slideshow was that the work he was showing didn't feel like a collection of his greatest achievements, more like milestones on this timeline of a project that is still evolving and alive.
Technology at this high of a level is very far out of my wheelhouse, but the implications of the research his team is doing are really exciting and fun to think about.

Reply

**Ruthie Williams** says: 11/14/2011 at 1:03 AM

It is amazing what has been accomplished in digital imaging technology over the last decade, and Mr. Debevec has clearly been one of the leaders at the forefront in its development. Some of the demos and clips that we were shown, especially what was rendered with the Light Stage technology, were overwhelmingly cool. I was especially dazzled by the ability to match lighting so that digital actors are patched in without the slightest hiccup of disbelief. In a couple of years, it seems that nothing will be too imaginative to be incorporated into digital films. Can't wait to see where things go from here!

Reply

**Larry Lai** says: 11/15/2011 at 9:33 AM

Paul Debevec's Light Stage is so incredible that anyone can be altered into "digital" and becomes an amazing character in the fantastic world of movies. Due to the development of hi-tech, the filmmakers have good opportunity to make the unreal become real in the viewers' eyes. However, the technique should be used on the right place at the right time; that is to say, we use this equipment when the story or content of the film needs it. I think the audience will expect more about how the story goes. And what enhances their expectation is the CG technique. We have taken a new adventure of filming due to state-of-the-art technology, by which the story can impress the audience more than before.

Reply

**Gregory Jones** says: 11/15/2011 at 1:31 PM

I had to miss seminar this week because of a family emergency. I've been very famliar with Paul's work for quite some time. I'm very sad that I had to miss it.

Reply

**Lisa Chung** says: 11/15/2011 at 2:27 PM

I have never been a fan of photo real computer generated imaging for animation but having Paul Debevec speak in seminar showed me that there is definitely a place and time for it especially when it's done right. It can be used in place of a stunt actor (Octavus in Spider Man), to show an aging actor (Benjamin Button) or place a fictional character on screen with a real actor (real steel). What I was most impressed with is how the computer generated human looked and felt like the real actor. Without Paul pointing these specific scenes out, I would have never known the difference.

I was also really impressed with the lighting stage Paul and his colleagues developed to achieve accurate lighting for 3D characters. Being able to witness the data collected to make these types of film, have made me more appreciative of them.

Thanks Paul for shining a new light on this topic for me.

Reply

**Emily Chung** says: 11/15/2011 at 2:52 PM

It was really a pleasure to have Mr. Debevec in our Seminar last week. The presentation was totally blowing my mind. The pictures he showed us were so amazing. Especially for people who wants to be a 3d modeler like me in the future, so I was really exciting during the whole class. Making a photo real 3d model has always been a goal that I was trying to achieve. So it was really good to see Mr. Debevec has showing us the processes of his works not just showing the final art works. Also he did a really good job to explain the whole processes, so I think I learned a lot this time.

Reply

**Rachel Jaffe** says: 11/15/2011 at 3:25 PM

Ranging from grayscale photographs of an actress designed to capture the glistening highlights of her face — whether lost light rays caught mid-shine or beadlets of moisture in monochrome — to behind-the-scenes snapshots of a light scene his team had constructed, Paul Debevec's presentation during last Wednesday's seminar was equally enthralling and educative (and one to which I'd been looking forward nearly the entire semester). Viewing the slideshow that he had compiled — an amalgamation of his work spanning a variety of purposes and, quasi-correspondingly, media — was as mesmerizingly entertaining (and edifying) as I had dared to hope prior to the presentation. Thanks, Paul, for preparing such a superbly detailed lecture for last Wednesday's seminar!

Reply

**Jay Kim** says: 11/15/2011 at 3:43 PM

What can I say? Paul Debevec is…umm, what are the words…oh yeah — THE MAN!! Paul is such a wonderful speaker because he is able to explain the complexities of amazing technologies in ways that are clear, intriguing, and fun. His presentation was seamless and it helped engage me into the type of work he is involved with. The best part about Paul's work is that it is continuously focused on the future. I have never successfully met a fortune teller in my life (I've wasted about $133.42 in trying to do so) but I'd say Paul, being able to tell the future, is as close as I'll ever get. Paul's lecture was already satisfying, but when he told me that in just a few bits of years sports gaming will evolve into a photorealistic spectacle my mind was blown — realistic sports gaming has been something I've wondered to myself for the past 15 years or so and now I have hope, yay!!

Reply

**Jordan Hansen** says: 11/15/2011 at 3:56 PM

Debevec was incredible to hear speak. I was familiar with some of his contributions to the Visual Effects and animation communities before seeing him, but I was not aware of how fast

and strongly he and his team are pushing the envelope. His work seems to be creating entirely new modes of production. It seems unbelievable, the way he and his team work. The thought process of production is changing immensely due to their work. I am most excited because, although their work is incredibly technically complex, it seems like it is putting more control in the hands of the artists. Artists are not married to greenscreen lighting or other less desirable image results. They can strive for the exact image required to convey meaning or tell a story. They are no longer limited to "good enough."

Reply

**Dan Wilson** says: 11/15/2011 at 4:04 PM

I feel the same as Lisa in that I've never been a fan of photorealistic CG characters — but Paul showed how well they can be used. Photorealism, I feel, defeats much of the purpose of animation — creating something that didn't exist before, not recreating something that exists already. However, with the technology Paul showed us, the animation acts more like a stage crew — doing its job if you don't know it's there. Something like The Spirits Within using today's technology still might not look good, and if it needs to capture a human performance, it may as well be live action.

It will be amazing to see this kind of technology applied to things it wasn't meant for. It needs to be flexible enough to drive something like a 2D character or relatively-abstract character in Maya.

Reply

**Joseph Yeh** says: 11/15/2011 at 4:06 PM

The Matrix is one of the greatest movies of all time because of its unprecedented never before seen action and eye opening conception. It doesn't matter what you say about Keanu Reeves because he is basically an awesome badass in every movie ever. His characters are always full of emotion and have millions of facets; it was quite an upset that he did not win an Oscar for his performance in The Matrix. Jokes aside, thanks to Paul Debevec's genius bullet time, The Matrix has revolutionized action films forever. His techniques in time splicing and film interpolation have paved the way for action storytellers to expanded their ability to convey fight choreograph. It has given filmmakers inspiration to top the standards of motion in fighting with modern day technology and visual effects.

Reply

**Di Gu** says: 11/15/2011 at 4:36 PM

I like Matrix, which is one of my favorites. I was really impressive by Paul's work last week. His job kind like accomplish my child dream that is making unreal entities become real. The development of technology is always beyond my expectation. I just thought this just happened in film, only created by concept designer. And the most attractive thing is everything Paul focus on, is the fantasy to future. It's totally exceeding the range of animation, film. He is a scientist, because he not only creates the incredible technology in film, but also changes the way people living, such as communication.

Reply

**Cecilia De Jesus** says: 11/15/2011 at 4:40 PM

Paul Debevec's presentation was a really fun and interesting experience. I loved how he was able to talk about really complicated CG techniques in way that an ordinary audience could understand. His work in Image Based Lighting (IBL) really blew me away. It's amazing that he is on the cutting edge of all this advanced technology and is integrating these techniques into movies as the technology evolves. I just learned how to use IBL in my Lighting and Rendering class and I can't imagine how these amazing minds develop these techniques and make it so accessible to users.

I also really enjoyed seeing his development and use of the Light Stages. It's crazy to see how he uses these stages to capture lighting and textures for CG. I also enjoyed seeing how this technology was applied to different movies in different ways. Paul really reflected how amazing this technology is while also showing how fun and exciting it can be.

Reply

**LaMar Ford** says: 11/15/2011 at 4:46 PM

It was inspiring to meet Paul Debevec last week. His presentation was intriguing, and I couldn't believe how much his work has shaped the film industry and advanced visual effects.

The holographic video conference and projection was mind blowing. It's crazy how technology is advancing to the point, which gadgets from science fiction films are coming to fruition. I can't wait to see filmmakers and consumers use the technology to communicate.

His viewpoint on the visual effects industry for the past 10 years fascinates me. I like the fact he acknowledged where the special effects and technology fail, such as Final Fantasy the Spirit Within and early motion capture films, in addition to the success. No matter how much technology advances, it's all about the story and the human performance.

Reply

**Brandon Lake** says: 11/15/2011 at 4:58 PM

I was pleasantly surprised about the presentation last week. It was like opening a magazine of popular science and seeing that the innovations of an unforeseen future were already in our hands. I had no idea about the progress people had been making in the fields of graphics, therefore Paul's charismatic lecture was made even more entertaining. I was happy that I was able to attend.

Reply

**Amy Ketchum** says: 11/15/2011 at 4:58 PM

Paul Debevec's accomplishments and innovation in the field of animation leaves one to wonder where animation will go next. It appears that we are headed more and more into a Ray Bradbury story in which our imaginations can create anything. I look forward to seeing what exciting new frontier Debevec will open for the field of animation.

Reply

**jovannatosello** says: 11/15/2011 at 5:24 PM

Paul Debevec presented clips and demos of the rapidly developing digital imaging technology which has contributed to the visual effects, film, and photo-realistic computer animation industry. Some of these technologies include Image Based Lighting which is a rendering technique which that maps the lighting characteristics of the surrounding surfaces feeding a global illumination and Light Stages, a method of create computer generated humans by capturing the amount of surface illumination of the actors face.

Reply

**Simon Wilches** says: 11/15/2011 at 6:03 PM

THE HOLO-PHONE IS COMING!!! ALL HAIL THE HOLO-PHONE!!!

I've been skeptic about many feature films animated by means of motion capture. For me, the technique felt very distant and heavily dependent on software more than artistic talent. However, even though my taste lies elsewhere I know the technique behind motion capture is an incredible achievement of human ingenuity so I was interested in hearing what this seminar was about.

To have Mr. Debevec show us the cogs that go behind this style of film-making was a great

opportunity for approaching this method and somewhat change my mind and prejudices.

The research and advances being made by Dr. Debevec and his team at the graphics laboratory are amazing. The amount of detail and observation skills required to produce a realistic human face are admirable. Still, they make me quite uneasy because it seems kinda artificial and perverted to be able to manipulate a human likeness just with a computer.

I admire that Mr. Debevec was so open in accepting the industry's failures in achieving a successful digital actor but I admire that they're still striding in that direction. And I look forward to the day when we can Mo-Cap a squirrel and apply that data to Tom Cruise's body.

Reply

**Eric Tortora Pato** says: 11/15/2011 at 7:53 PM

Sorry for being a bit behind the wire. I'm fighting off being sick right now and lost track of time. I think there's one simple thing that I can say to the power of Mr. Debvec's work. In many of these lectures, especially those waited towards the technical side, people are able to amaze or intrigue us with footage and samples of what they are doing now, the new stuff we haven't seen before. Mr. Debvec was the first to amaze me with footage that I saw half a decade ago. That's more bad ass than something new, even if the new thing is the holo-phone.

Reply

**Tristan Dyer** says: 11/16/2011 at 3:59 PM

Seeing some of the work that Paul Debevic and his team is creating was pretty mind bending. Never mind the photoreal lighting and placing scanned actors onto 3D models. It's just cool enough to watch the high speed footage of the lightstage in action. Then to see a mirror that spins at 900rpm to create a hologram without ghosting is quite amazing.

Reply

**Simo Liu** says: 11/16/2011 at 5:19 PM

I was really impressive by Paul's speech last week. 3D technology is really a great power to make the unreal things into real in viewers' eyes. He showed us many fantastic movies which combined the 3D technology perfectly and cannot be told the truth by audience. I like the way he told us more detail about how to use the 3D technology to make the "real" human and world. His way of speaking with great logic and train of thought made the 3D technology easily understand and seemed to make it more easy to learn and grasp. I was also impressed by the movie "Robot"(I cannot remember the name clearly.) which he showed last week. I exclaimed its imagination to change the body into different shapes and with great visual power. It is really awesome! Thanks for Paul who gave us a wonderful visual enjoyment last week!

Reply

**Chen Huang** says: 11/21/2011 at 12:53 PM

The image Paul showed us in the seminar is so exciting.... 3D teachnology as a tool, is being more and more developed.... I feel so lucky that I can witness the process of the development in USC....the visual is incredible .....

Reply

**A.W. Gammill** says: 11/26/2011 at 12:03 AM

As the student assistant for many of the VFX related classes, Paul Debevec's name comes up very often. And, if not his name, then one of his amazing contributions to film, or even one of the groundbreaking films to which he has contributed his talents. Mr. Debevec's work is part of huge chunks of the things that students in many of the classes at USC are studying and attempting to learn, master, and use in their own projects. I really love the seminars where the people who are responsible for entire lectures in the classes we attend come to speak.

It was more than great to hear him talk about his work. He is a really great speaker; engaging and informed. I think USC is very lucky to have him as staff and I hope he can come and speak again. This was one of the best seminars ever!

Reply

**Lanzhu Jian** says: 11/29/2011 at 1:29 AM

Paul Debevec's is awesome, I admire his work in Matrix and I m totally amazed by the his effort on VFX team. It is one of the most important thing attract Chinese students come to study in United States. His work and knowledge behind the film is amazing, and he is a really tough man on this aspect, I can see people respect him with his great knowledge and outstanding characteristic. Allowed me quote from Jay's comment: his speech helped engage me into the type of work I m involved with.

Reply

**Einar Baldvin Árnason** says: 12/06/2011 at 5:03 PM

It is always a great pleasure to listen to an accomplished industry professional who is so excited about their work and interested in conveying their ideas to the audience. Mr. Debevec is at the forefront of the digital revolution and was able to offer us a glimpse into the exciting future that technology has to offer.

I am always impressed by those who work hard, acknowledge their own limits and then strive to improve on those. Mr. Debevec impressed me in terms of his expertise, vast knowledge and desire to take his work further, he is aware of the limits of current digital technology but is determined to make sure those do not remain limits for long and I applaud that.

Reply

**Yang Liu** says: 12/07/2011 at 4:24 PM

I missed the seminar because I was stuck in traffic returning from my internship. I got back to campus around 8pm. It was very bad missing Paul Debevec's talk, as I'd love to get into the computer science classes in the coming semesters. It's great to know DADA is making a good connection within engineering school and I think everyone should take the chance working with them.

Reply

**Linda Jules** says: 12/09/2011 at 2:30 AM

It was wonderful to have Paul Debevec come to speak to us. This particular seminar was most exciting to me because Paul's lab is doing research in so many different areas that I am interested in. USC holds a unique position in the academic community because it is such a true place for merging past tried and true forms of technology with future innovations in film making technology.

The two things that stood out the most for me in Paul's presentation were the holographic revolver and Emily. The holographic revolver was interesting to me because it was a perfect example of a fantastic piece of technology that essentially built using "older" pre-existing systems–mirrors, motors and light. I found Emily exciting because, well, she just looked so REAL!

Reply

**Miguel Jiron** says: 12/09/2011 at 9:10 AM

This higher end of technology is definitely out my realm of experience, but thinking of its future

implications is bewildering. In a great way. Debevec's light stage seems incredible, and an important step in creating realistic "compositing" matching light readings with exact precision. Animation's a wonderful medium in particular because it can incorporate these major technological advances with its resources and support. I believe we're living through another industrial age, a much faster one, and it's dizzyingly exciting to see not just where we're headed but where we already are.

Reply

**emanuela** says: 09/02/2013 at 7:50 AM

I'm Emanuela from VIEW Conference, the premiere international event in Italy on Computer Graphics, Interactive Techniques, Digital Cinema, 2D/3D Animation, Gaming and VFX. The Conference will take place in Turin, from the 15th to the 18th October 2013.

I'm writing to you to announce that there's a unique opportunity of taking a 6 hour workshop on "Lighting, Appearance, and Animation for Photoreal Digital Actors Appearance, and Animation for Photoreal Digital Actors " with the image-based modelling and rendering techniques master Paul Debevec from the USC's Institute for Creative Technologies.

Paul Debevec leads the ICT Graphics Laboratory as Associate Director of Graphics Research at USC's Institute for Creative Technologies. His work is focused on image-based modeling and rendering techniques with specializations in high dynamic range imaging, reflectance measurement, facial animation, and image-based lighting. Paul Debevec's digital inventions have powered the breathtaking visual effects in films like The Matrix, Superman Returns, King Kong and The Curious Case of Benjamin Button. He serves as the Vice President of ACM SIGGRAPH and received a Scientific and Engineering Academy Award® in 2010 for his work on the Light Stage facial capture systems.

For Wired (http://daily.wired.it/foto/2012/02/10/50-persone-cambiano-mondo-19876.html) Paul Debevec is one of the people who's changing the world.

Here some details on the workshop:

Lighting, Appearance, and Animation for Photoreal Digital Actors

Paul Debevec , Associate Director, Graphics Research – USC Institute for Creative Technologies

Monday 14 October 9.30 – 17.00 | Centro Congressi Torino Incontra, via Nino Costa 8, Turin – Sala Giolitti| Session Length: 6 hours (excluding 1:30 lunch break)

Price: 100 € students | 200 € professionals | 300 € companies

Session structure:

1. Lighting Reconstruction: Recording the Light where your ActorShould Go

2. Facial Geometry and Texture Modeling

3. Skin Appearance

4. Facial Scan Processing

5. Animation

6. Case Studies

Reply

## Leave a Comment

Enter your comment here...